

## **Appendix D**

### **OUTLINE OF DDS-30**

Executive summary of results, "1995 National assessment of United States oil and gas resources" by U.S. National Oil and Gas Resource Assessment Team

"Introduction, purpose and scope" by D.L. Gautier

"CD-ROM design notes for DDS-30" by K.I. Takahashi

#### **METHODOLOGY**

- A. Assessment of conventional oil and gas
  - 1. "Methodology for assessment of undiscovered conventional accumulations" by D.L. Gautier and G.L. Dolton
  - 2. "Deep natural gas reservoirs and conventional plays in the United States" by T.S. Dyman, M.S. Wilson, and W.R. Beeman
- B. Assessment of unconventional oil and gas
  - 1. "Probabilistic methodology and computer programs for assessment of unconventional oil and gas resources" by R.A. Crovelli and R.H. Balay
  - 2. "Method for assessing continuous-type (unconventional) hydrocarbon accumulations" by J.W. Schmoker
  - 3. "Methodology for assessment of technically recoverable resources of coalbed gas" by D.D. Rice, G.B.C. Young, and G.W. Paul
  - 4. "Gas hydrate resources of the United States" by T. S. Collett
  - 5. "Heavy-oil resources of the United States" by Mark Pawlewicz
- C. Other
  - 1. "Annotated bibliography of methodology for assessment of undiscovered oil and gas resources" by R.R. Charpentier, G.L. Dolton, and G.F. Ulmishek
  - 2. "Development and use of a geographic information system (GIS) for resource appraisal" by W.R. Beeman

#### **DESCRIPTIONS OF PROVINCES AND PLAYS ASSESSED**

The author of the province report is the author of all the province and play text unless otherwise noted. All unconventional plays are listed; frequently they are written by an author who is not the province geologist.

"Introduction to play narratives" by K. L. Varnes

"Region 1 Alaska" by K. J. Bird

"Northern Alaska Province (001)" by K. J. Bird

"Central Alaska Province (002)" by R. G. Stanley

"Kandik Basin" by D. G. Howell

"Southern Alaska Province (003)" by L. B. Magoon, C.M. Molenaar, T.R. Bruns, M.A. Fisher, and Z.C. Valin

"Introduction" by L.B. Magoon  
"Alaska Peninsula" by C. M. Molenaar  
"Cook Inlet Basin" by L. B. Magoon  
"Gulf of Alaska" by T. R. Bruns  
"Copper River Basin" by L. B. Magoon and Z.C. Valin  
"Southeast Alaska Area" by T. R. Bruns  
"Kodiak Islands" by M.A. Fisher

"Region 2 Pacific Coast" by K.J. Bird, L.B. Magoon, and M.E. Tennyson

"Western Oregon-Washington Province (004)" by S.Y. Johnson and M.E. Tennyson

a. Continuous-type play:

0412 "Willamette - Puget Sound Basin-Centered Gas play" by B.E. Law

b. Coal-bed gas plays

0450 "Western Washington - Bellingham Basin play 0450" by S.Y. Johnson and D.D. Rice

0451 "Western Washington - Western Cascade Mountains play 0451" by S.Y. Johnson and D.D. Rice

0452 "Western Washington - Southern Puget Lowlands play 0452" by S.Y. Johnson and D.D. Rice

" Eastern Oregon-Washington Province (005)" by M.E. Tennyson

Continuous-type play:

0503 "Columbia Basin - Basin-Centered Gas play 0503" by B. E. Law

"Klamath - Sierra Nevada Province (006) (Not assessed)

"Northern Coastal Province (007)" by R.G. Stanley

"Sonoma-Livermore Basin Province (008)" by L. B. Magoon

"Sacramento Basin Province (009)" by L. B. Magoon and Z.C. Valin

"San Joaquin Basin Province (010)" by L.A. Beyer

"Central Coastal Province (011)" by R.G. Stanley, with a section on Cuyama Basin by M. E. Tennyson

"Santa Maria Basin Province (012)" by M.E. Tennyson

"Ventura Basin Province (013)" by M.A. Keller

"Los Angeles Basin Province (014)" by L. A. Beyer

Continuous-type play:

1408 "Deep, Over-Pressured Fractured Rocks of the Central Syncline Play"

"San Diego - Oceanside Province (015)" To be assessed by MMS

"Salton Trough Province (016)" by C.E. Barker

"Region 3- Colorado Plateau and Basin and Range" by J.A. Peterson and J.A. Grow

"Idaho-Snake River Downwarp Province (017)" by J. A. Peterson

"Western Great Basin Province (018)" by C. E. Barker, T.D. Fouch, J.A. Grow, and J.A. Peterson

"Eastern Great Basin Province (019)" by J. A. Peterson and J. A. Grow

"Uinta - Piceance Basin Province (020)" by C.W. Spencer

- a. Continuous-type play:
  - 2009 Cretaceous Self-Sourced Fractured Shales Oil
- b. Tight-gas plays of the Piceance basin
  - 2007 Tight Gas Piceance Mesaverde Williams Fork play
  - 2010 Tight Gas Piceance Mesaverde Iles
- c. "Tight gas plays of the Uinta Basin" by T.D. Fouch and J.W.Schmoker
  - 2015 Tight Gas Uinta Tertiary East
  - 2016 Tight Gas Uinta Tertiary West
  - 2018 Basin Flank Uinta Mesaverde
  - 2020 Deep Synclinal Uinta Mesaverde
- d. "Coalbed gas plays of the Uinta Basin" by D.D. Rice, T.M. Finn, and W.B. Cashion
  - 2050 Uinta Basin - Book Cliffs
  - 2051 Uinta Basin - Sego
  - 2052 Uinta Basin - Emery
- e. "Coalbed gas plays of the Piceance Basin" by R.C. Johnson, D.D. Rice, and T.M. Finn
  - 2053 Piceance Basin - White River Dome
  - 2054 Piceance Basin - Western Basin Margin
  - 2055 Piceance Basin - Grand Hogback
  - 2056 Piceance Basin - Divide Creek Anticline

"Paradox Basin Province (021)" by A. C. Huffman, Jr.

Continuous-type play:

2103 Fractured Interbed

"San Juan Basin Province (022)" by A.C. Huffman, Jr.

- a. Continuous-type plays:
  - 2205 Dakota Central Basin Gas
  - 2208 Mancos Fractured Shale
  - 2209 Central Basin Mesaverde Gas
  - 2211 Pictured Cliffs Gas
- b. "Coal-bed gas plays" by D. D. Rice and T. M. Finn
  - 2250 San Juan Basin - Overpressured
  - 2252 San Juan Basin - Underpressured Discharge
  - 2253 San Juan Basin - Underpressured

"Albuquerque - Santa Fe Rift Province (023)" by C.M. Molenaar

"Northern Arizona Province (024)" by W.C. Butler

"Southern Arizona - Southwestern New Mexico Province (025)" by W.C. Butler

"South-Central New Mexico Province (026)" by W. C. Butler

"Region 4-Rocky Mountains and Northern Great Plains" by C.W. Spencer

"Montana Thrust Belt Province (027)" by W. J. Perry, Jr.

- a. Continuous-type play by W. J. Perry, Jr.

- 2703 Cone Calcareous Member, Marias River Shale
- "North-Central Montana Province (028)" by T. S. Dyman
  - a. Continuous-type plays:
    - 2804 Bakken Shale Fracture Systems
  - "Northern Great Plains Biogenic Gas plays" by D.D. Rice and C. W. Spencer
    - 2810 Northern Great Plains Biogenic Gas, High Potential
    - 2811 Northern Great Plains Biogenic Gas , Moderate Potential (Suffield Block Analog)
    - 2812 Northern Great Plains Biogenic Gas, Low Potential
- "Southwest Montana Province (029)" by W. J. Perry, Jr.
- "Williston Basin Province (031)" by J. A. Peterson
  - a. "Williston Basin Province continuous-type plays" by J. W. Schmoker
    - 3110 Bakken Fairway
    - 3111 Bakken Intermediate
    - 3112 Bakken Outlying
    - 3113 Southern Williston Basin Margin - Niobrara Shallow Biogenic
- "Sioux Arch Province (032)" by J. A. Peterson
- "Powder River Basin Province (033)" by G.L. Dolton and J. E. Fox
  - a. Continuous-type plays:
    - 3308 Mowry Fractured Shale
    - 3311 Niobrara Fractured Shale
  - b. "Coalbed gas plays" by D.D. Rice and T.M. Finn
    - 3350 Powder River Basin - Mining-related
    - 3351 Powder River Basin - Central Basin
- "Bighorn Basin Province (034)" by J. E. Fox and G. L. Dolton
  - a. Continuous-type play:
    - 3404 Basin-Center Gas
- "Wind River Basin Province (035)" by J.E. Fox and G. L. Dolton
  - a. Continuous-type play:
    - 3505 Basin-Center Gas
  - b. "Coalbed gas play " by R.C. Johnson and D.D. Rice
    - 3550 Wind River Basin - Mesaverde
- "Wyoming Thrust Belt Province (036)" by R.B. Powers
- "Southwestern Wyoming Province (037)" by B.E. Law
  - a. Continuous-type plays:
    - 3740 Greater Green River Basin - Cloverly-Frontier
    - 3741 Greater Green River Basin - Mesaverde
    - 3742 Greater Green River Basin - Lewis
    - 3743 Greater Green River Basin - Fox Hills-Lance
    - 3744 Greater Green River Basin - Fort Union
  - b. Coal-bed gas plays:
    - 3750 Greater Green River Basin - Rock Springs
    - 3751 Greater Green River Basin - Iles

- 3752 Greater Green River Basin - Williams Fork
- 3753 Greater Green River Basin - Almond
- 3754 Greater Green River Basin - Lance
- 3755 Greater Green River Basin - Fort Union
- "Park Basins Province (038)" by C. J. Wandrey and C.E. Barker
  - a. Continuous-type play:
    - 3803 "Upper Cretaceous Niobrara Fractured Shale Oil play 3803" by R. M. Pollastro
- "Denver Basin Province (039)" by D. K. Higley, R.M. Pollastro, and J.L. Clayton
  - a. Continuous-type plays:
    - 3904 Greater Wattenberg Codell/Niobrara Oil and Gas
    - 3906 J Sandstone Deep Gas (Wattenberg)
    - 3911 "Fractured Shale - Pierre (play 3911)" by D.K. Higley and D.L. Gautier
    - 3920 Fractured Niobrara - Greater Silo/Dale Salt-Edge Oil
    - 3921 Fractured Niobrara - Greater Northern Denver Basin Oil
- "Las Animas Arch Province (040)" by C. W. Keighin
- "Raton Basin - Sierra Grande Uplift Province (041)" by C. W. Keighin
  - a. "Raton Basin coalbed gas plays" by D.D. Rice and T.M. Finn
    - 4150 Northern Raton Basin
    - 4151 Raton Basin - Purgatoire River
    - 4152 Southern Raton Basin
- "Region 5–West Texas and Eastern New Mexico" by M. M. Ball, M.E. Henry, and W.J. Perry, Jr.
  - "Pedernal Uplift Province (042)" by M. M. Ball and M.E. Henry
  - "Palo Duro Basin Province (043)" by M. M. Ball and M.E. Henry
  - "Permian Basin Province (044)" by M. M. Ball
  - "Bend Arch - Fort Worth Basin Province(045)" by M. M. Ball and W.J. Perry, Jr.
    - Continuous-type play:
      - 4503 Mississippian Barnett Shale
  - "Marathon Thrust Belt Province (046)" by W. J. Perry, Jr., and M.E. Henry
- "Region 6–Gulf Coast" by C.J. Schenk
  - "Western Gulf Province (047)" by C.J. Schenk and R.J. Viger
    - Continuous-type plays:
      - 4747 Austin Chalk - Pearsall
      - 4748 Austin Chalk - Giddings
      - 4749 Austin Chalk - Outlying
  - "East Texas Basin Province (048) and Louisiana-Mississippi Salt Basins Province (049)" by C.J. Schenk and R.J. Viger
    - Continuous-type play:
      - 4923 Cotton Valley Blanket Sandstones Gas
  - "Florida Peninsula Province (050)" by R. M. Pollastro

"Region 7– Midcontinent" by R. R. Charpentier

"Superior Province (051)" by J. G. Palacas

"Iowa Shelf Province (052)" by J. G. Palaca

"Cambridge Arch - Central Kansas Uplift Province (053) " by D. K. Higley

"Salina Basin Province (054) Sedgwick Basin Province (059)" by S. E. Prensky

"Nemaha Uplift Province (055)" by R. R. Charpentier

"Forest City Basin Province (056)" by R. R. Charpentier

Coal-bed gas play:

5650 "Forest City Basin - Central Basin play 5650" by D. D. Rice

"Ozark Uplift Province (057)" by J. R. Hatch

"Anadarko Basin Province (058)" by M. E. Henry and T. C. Hester

"Continuous-type play":

5811 "Woodford/Chattanooga/Arkansas Novaculite of Midcontinent play

5811" by J. W. Schmoker

Prov. 59. (See Prov. 54)

"Cherokee Platform Province (060)" by R. R. Charpentier

Coal-bed gas play:

6050 "Cherokee Platform - Central Basin play 6050" by D.D. Rice

"Southern Oklahoma Province (061)" by M. E. Henry and T. C. Hester

"Arkoma Basin Province (062)" by W. J. Perry, Jr.

"Arkoma Basin Province coal-bed gas plays" by D.D. Rice

6250 Arkoma Basin - Anticline

6251 Arkoma Basin - Syncline

"Region 8–Eastern" by R. T. Ryder

"Michigan Basin Province (063)" by G. L. Dolton

Continuous-type plays:

6319 Antrim Shale Gas, Developed Area

6320 Antrim Shale Gas, Undeveloped Area

"Illinois Basin Province (064)" by D. L. Macke

a. Continuous-type play:

6407 "Illinois Basin–New Albany Shale Gas play 6407" by J. R. Hatch

b. "Illinois Basin Province coal-bed gas play" by D.D. Rice, T. M. Finn, and J. R. Hatch

6450 Illinois Basin - Central Basin

"Black Warrior Basin Province (065)" by R. T. Ryder

"Black Warrior Basin Province coal-bed gas plays" by D.D. Rice and T. M. Finn

6550 Black Warrior Basin Recharge

6551 Black Warrior Basin - Southeastern Basin

6552 Black Warrior Basin - Coastal Plain

6553 Black Warrior Basin - Central and Western Basin

"Cincinnati Arch Province (066)" by R. T. Ryder

Continuous-type play:

6604 "Devonian Black Shale Gas play 6604" by R.T. Ryder and J.R. Hatch

"Appalachian Basin Province (067)" by R. T. Ryder

a. Continuous-type plays Clinton/Medina Gas plays: (6728 through 6731)

6728 Clinton/Medina Sandstone Gas High Potential

6729 Clinton/Medina Sandstone Gas Medium Potential

6730 Clinton/Medina Sandstone Gas Medium-Low Potential

6731 Clinton/Medina Sandstone Gas Low Potential

Upper Devonian Sandstone Gas plays: (6733 through 6736)

6733 Upper Devonian Sandstone Gas High Potential

6734 Upper Devonian Sandstone Gas Medium Potential

6735 Upper Devonian Sandstone Gas Medium-Low Potential

6736 Upper Devonian Sandstone Gas Low Potential

"Devonian Black Shale Gas plays" by R.C. Milici

6740 Devonian Black Shale Gas - Greater Big Sandy

6741 Devonian Black Shale Gas - Greater Siltstone Content

6742 Devonian Black Shale Gas - Lower Thermal Maturity

6743 Devonian Black Shale Gas - Undeveloped Northeastern Ohio and  
Western Pennsylvania

b. "Coal-bed gas plays" by D.D. Rice and T.M. Finn

6750 Northern Appalachian Basin - Anticline

6751 Northern Appalachian Basin - Syncline

6752 Central Appalachian Basin - Central Basin

6753 Cahaba Coal Field

"Blue Ridge Thrust Belt Province (068), Piedmont Province (069), Atlantic  
Coastal Plain Province (070), Adirondack Uplift Province (071), and New  
England Province (072)" by R.C. Milici

**NARRATIVE SUMMARIES OF UNCONVENTIONAL PLAYS BY TYPE (These  
summaries also have been integrated into the reports by Region and Province  
above.)**

A. "Introduction to narratives for continuous-type accumulations" by J. W.  
Schmoker

B. "Geologic framework and description of coalbed gas plays" by D.D. Rice  
Introduction

Region 2-Pacific Coast

"Western Washington (part of Province 104)" by S.Y. Johnson and D. D.  
Rice  
plays 0450, 0451, 0452

Region 3-Colorado Plateau and Basin and Range

Uinta-Piceance Basin Province (020)

"Uinta Basin" by D.D. Rice, T.M. Finn, and W.B. Cashion  
plays 2050, 2051, 2052

"Piceance Basin" by R.C. Johnson, D.D. Rice, and T.M. Finn  
plays 2053 through 2057

"San Juan Basin Province (022)" by D.D. Rice and T.M. Finn  
plays 2250, 2252, 2253

Region 4-Rocky Mountains and Northern Great Plains

"Powder River Basin Province (033)" by D.D. Rice and T.M. Finn  
plays 3350, 3351

"Wind River Basin Province (035)" by R.C. Johnson and D.D. Rice  
play 3550

"Southwestern Wyoming Province (037)" by B.E. Law  
plays 3750 through 3755

"Raton Basin Province (041)" by D.D. Rice and T.M. Finn  
plays 4150, 4151, and 4152

"Region 7-Midcontinent" by D.D. Rice, T.M. Finn, and J.R. Hatch

Forest City Basin Province (056)  
play 5650

Cherokee Platform Province (060)  
play 6050

Arkoma Basin Province (062)  
Plays 6250, 6251

Region 8-Eastern

"Illinois Basin Province (064)" by D.D. Rice, T.M. Finn, and J.R. Hatch  
play 6450

"Black Warrior Basin Province (065)" by D.D. Rice and T. M. Finn  
plays 6550 through 6553

"Appalachian Basin Province (067)" by D.D. Rice and T.M. Finn  
plays 6750 through 6753